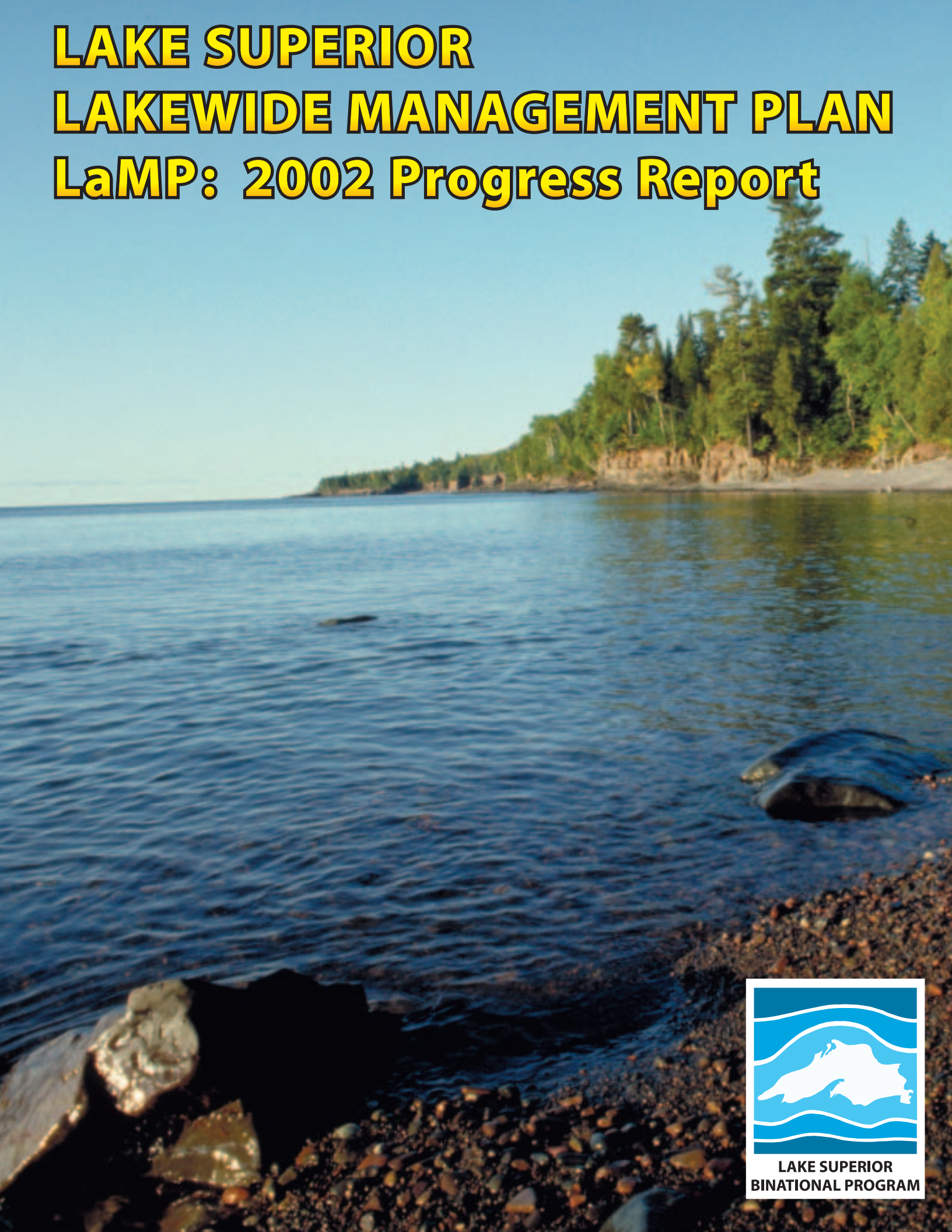
LAKE SUPERIOR LAKEWIDE MANAGEMENT PLAN LaMP: 2002 Progress Report



LAKE SUPERIOR BINATIONAL PROGRAM

Front cover photo: North Shore Beach of Lake Superior
Photograph by Dave Hansen,
Minnesota Extension Service

LAKE SUPERIOR LAKEWIDE MANAGEMENT PLAN LaMP: 2002 Progress Report

April 2002

prepared by the Lake Superior Work Group
Lake Superior Binational Program

Aussi disponible en Français

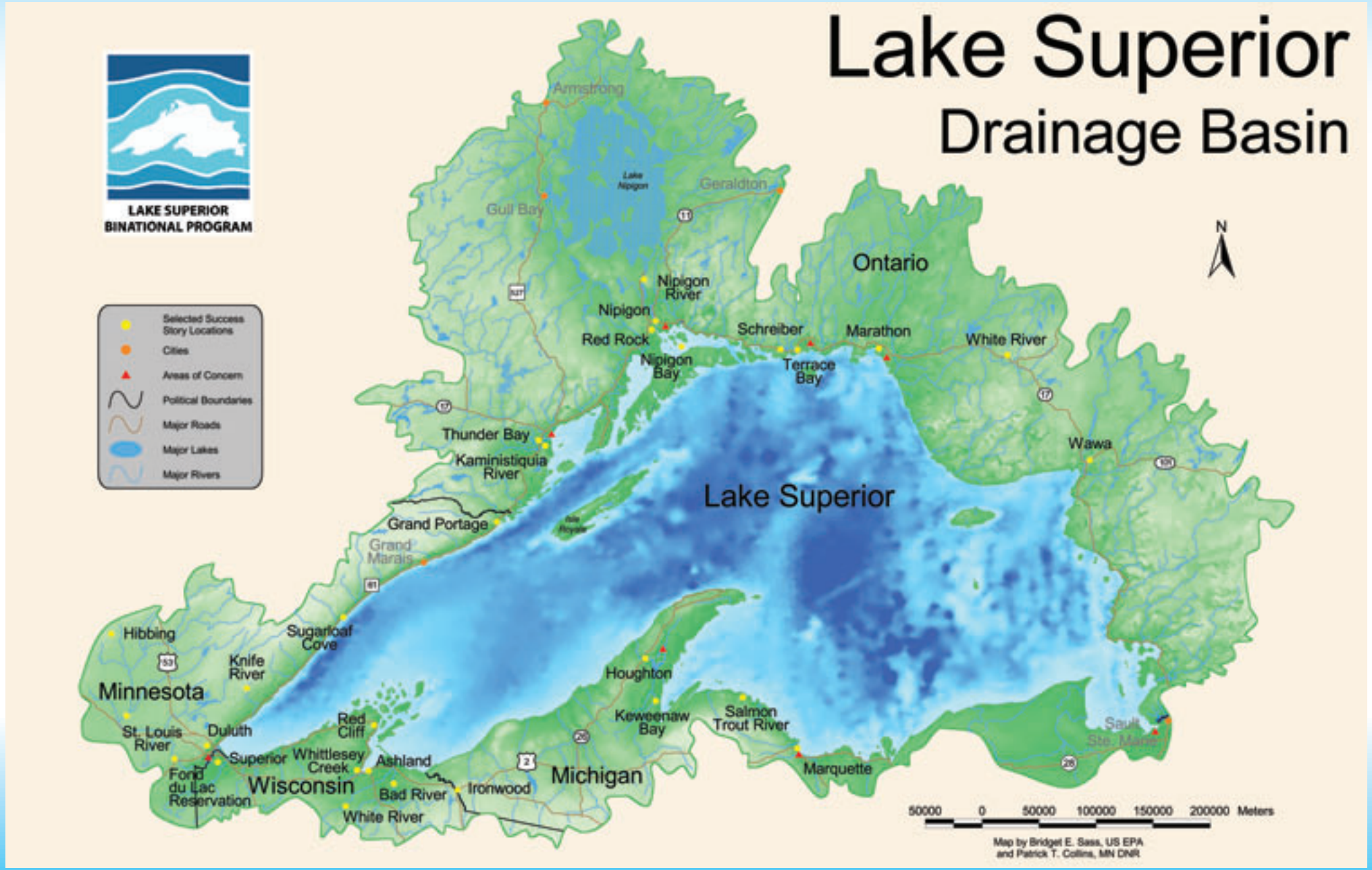

Lake Superior
Drainage Basin
LAKE SUPERIOR
BINATIONAL PROGRAM
Selected Success Story Locations
Cities
Areas of Concern
Political Boundaries
Major Roads
Major Lakes
Major Rivers
N
Armstrong
Lake Nipigon
Geraldton
Gull Bay
Ontario
Nipigon River
Nipigon
Red Rock
Nipigon Bay
Schreiber
Terrace Bay
Marathon
White River
Thunder Bay
Kaministiquia River
Wawa
Lake Superior
Isle Royale
Grand Portage
Grand Marais
Hibbing
Sugarloaf Cove
Knife River
Minnesota
Houghton
Keweenaw Bay
Salmon Trout River
Sault Ste. Marie
St. Louis River
Duluth
Red Cliff
Superior
Whittlesey Creek
Ashland
Fond du Lac Reservation
Wisconsin
Bad River
Ironwood
Michigan
Marquette
White River
50000 0 50000 100000 150000 200000 Meters
Map by Bridget E. Sass, US EPA
and Patrick T. Collins, MN DNR

Table of Contents

Photograph by Don Breneman

A Vision for Lake Superior

Endorsed by the Lake Superior Binational Forum on January 31, 1992, as an expression of the hearts and minds of all of us.

Photograph by Patrick T. Collins,
Minnesota Department of Natural Resources

As citizens of Lake Superior, we believe...

that water is life and the quality of water determines the quality of life.

We seek a Lake Superior watershed...

that is a clean, safe environment where diverse life forms exist in harmony; where the environment can support and sustain economic development and where the citizens are committed to regional cooperation and a personal philosophy of stewardship;

that is free of toxic substances that threaten fish, wildlife and human health; where people can drink the water or eat the fish anywhere in the lake without restrictions;

where wild shorelines and islands are maintained and where development is well planned, visually pleasing, biologically sound, and conducted in an environmentally benign manner;

which recognizes that environmental integrity provides the foundation for a healthy economy and that the ingenuity which results from clean, innovative and preventive management and technology can provide for economic transformation of the region;

where citizens accept the personal responsibility and challenge of pollution prevention in their own lives and lifestyles and are committed to moving from a consumer society to a conserver society; and

where there is greater cooperation, leadership and responsibility among citizens of the basin for defining long term policies and procedures which will protect the quality and supply of water in Lake Superior for future generations.

We believe that by effectively addressing the issues of multiple resource management in Lake Superior, the world's largest lake can serve as a worldwide model for resource management.

Section 1

The Lake Superior LaMP: 2002 Progress Report

Photograph by Steven Hanson

Introduction

Breathtaking, rocky cliffs towering over shimmering, aquamarine waters…hidden, mysterious coves protecting an astonishing array of terrestrial and aquatic habitat…deep, crystal-clear, frigid waters silently guarding the final resting place for more than 350 shipwrecked vessels…. These are some of the images evoked by the "greatest" of the Great Lakes-Lake Superior, or as the Ojibwe people named it, "Gichigami."

Yet there is a less pleasing side to what appears to be a beautiful and pristine Lake Superior basin. A history of industrial pollution, population growth beyond urban areas, development of rural and waterfront vacation properties without proper planning and regulation, and continuing deposition of contaminants from the air mean that Lake Superior is not immune from human influence. This influence has long-term implications because water that enters Lake Superior stays in the lake for an average of 173 years before it exits through the St. Marys River. Consequently, in 2002, we must still be vigilant stewards as we try to preserve a lake that contains fully 10 percent of the available fresh water on Earth.

Several binational and national programs have been developed to protect, restore, and maintain the Lake Superior ecosystem. Foremost among them is the Great Lakes Water Quality Agreement (GLWQA), which has been hailed as a seminal example of international environmental cooperation. The 1978 GLWQA between the United States and Canada commits the governments to "restore and maintain the chemical, physical and biological integrity of the waters of the Great Lakes Basin Ecosystem."

Chapel Rock - Pictured Rocks National Lakeshore
Photograph courtesy of Michigan Travel Bureau

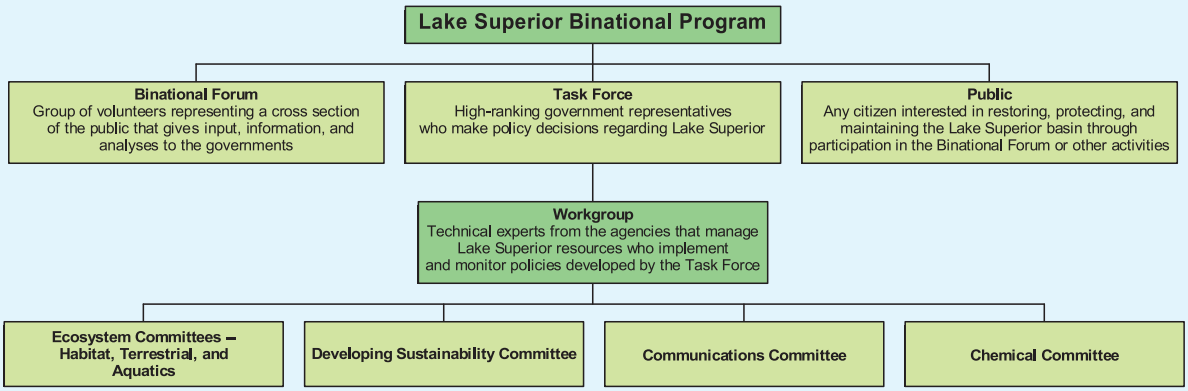
To achieve that goal, the "Binational Program to Restore and Protect Lake Superior" was created in 1991. The Binational Program represents a partnership of federal, state, provincial, and Tribal/First Nation governments working together with citizens to ensure the protection of this international treasure. In 2001, the Binational Program celebrated ten years of progress

What is the Lake Superior Binational Program?

To preserve the unique and pristine nature of the Lake Superior ecosystem, the Binational Program was signed by the Canadian and U.S. federal governments; the Province of Ontario; and the States of Michigan, Minnesota, and Wisconsin. The program identified two major areas of study:

- Zero Discharge Demonstration Program (ZDDP) - a singularly unique program in the world dedicated to achieving zero discharge or emission of nine persistent, bioaccumulative, toxic substances into the Lake Superior basin
- The "Broader Program" focusing on the protection and restoration of the Lake Superior basin ecosystem

Organization of the Binational Program



toward achieving its goals of zero discharge of critical pollutants and protecting and restoring the ecosystem.

Lakewide Management Plan 2000

To accomplish the goals of the GLWQA and the Binational Program and to address the challenges remaining for the basin, a Lake Superior Lakewide Management Plan (LaMP) was developed, to lay out a strategic, action-focused management plan for restoring and protecting the ecosystem. The LaMP focuses on collaborative ecosystem management and partnership activities targeted at zero discharge of nine critical pollutants, protecting and restoring high-quality habitat, and sustaining high-quality terrestrial and aquatic communities. This extensive compilation of scientific information and environmental action plans for Lake Superior and its watershed was released in April 2000.

LaMP 2000 focused on six discrete issue areas, setting goals for each:

- **Critical pollutants:** achieve zero discharge of nine persistent toxic chemicals by 2020
- **Habitat:** protect, maintain, and restore high-quality habitat in the basin
- **Terrestrial wildlife communities:** sustain diverse, healthy wildlife communities
- **Aquatic communities:** sustain diverse, healthy aquatic communities
- **Human health:** define and reduce the risk to people from environmental contaminants

Binational Forum Accomplishments

The Binational Forum has not only provided valuable public input for LaMP development, but it has also made direct contributions to the plan's implementation. Forum efforts to date are identified below.

- Developed load reduction targets for zero discharge
- Provided mini-grants to community groups for outreach activities
- Provided input to the development of ecosystem principles and objectives for "Indicators and Targets for Lake Superior"
- Conducted a community development organization survey
- Provided the Lake Superior Magazine Achievement Award
- Developed a report on basin attitudes toward pollution prevention and zero discharge
- Provided information to governments from a wide variety of input on binational issues

- **Sustainability:** cultivate a society in which humans use but do not degrade the basin's natural resources

LaMP 2000: Accomplishments and Challenges

LaMP 2000 identified 348 priority projects as necessary to help achieve the LaMP goals. To date, 175 projects have been funded, and 173 projects still require funding. Thus, since April 2000, roughly 50 percent of the LaMP's priority projects have been initiated, representing significant progress on the part of the Binational Program toward achieving the LaMP 2000 goals. The remaining projects have not yet been funded primarily because of lack of personnel and financial resources. For more information on the 348 priority projects, please visit the Great Lakes Commitment Tracking Database at *http://www.epa.gov/glnpo/lakes.html.*

Each section in this LaMP progress report highlights specific successes as well as challenges. Below are some of the general highlights of our accomplishments in protecting and restoring the Lake Superior basin.

- A continuing decrease in concentrations of targeted critical pollutants in Lake Superior; the year 2000 goal of reducing mercury emissions by 60 percent has been met.
- Almost complete restoration of the lake trout population to historical levels; the lake trout population had significantly declined in Lake Superior.
- Continued collection of banned or cancelled pesticides through the federally and state-funded "Clean Sweep" programs; these programs have prevented tons of pesticides from being released into the Great Lakes ecosystem.
- Protection of 29,000 acres of land along the St. Louis River and its tributaries in Wisconsin and Minnesota.
- Implementation of a mercury collection and recycling project on the Canadian north shore that has participation from industry, municipalities, and citizens.
- The awarding of grants from the U.S. Environmental Protection Agency's (U.S. EPA) Great Lakes National Program Office (GLNPO) to fund the Western Lake Superior Sanitary District in Duluth, Minnesota, to work with its customers to find alternative products and processes to considerably reduce mercury in wastewater discharges; this pollution prevention approach has been adopted in other areas (such as Marquette, Michigan) as a blueprint for elimination of mercury.
- Support for a watershed-scale geographic information system (GIS) across the Lake Superior basin; this is a practical tool that researchers and decision-makers can apply to support local land and resource decisions.
- Integration of land use planning across jurisdictions, such as in the Whittlesey Creek Refuge in northern Wisconsin.
- A joint Task Force, Workgroup, and Forum meeting at which four priority focus areas were identified for further discussion: mercury retirement from the marketplace, human health, burn barrels, and customized outreach on local land use planning.

Despite these and other successes, challenges remain for the Lake Superior basin, including

- A continuing need for fish advisories
- Continuing releases of mercury from coal-burning electric utilities and taconite mines
- Waste disposal practices that lead to mercury and dioxin contamination
- Continuing use of polychlorinated biphenyl (PCB)-bearing transformers and capacitors
- Poor land use practices that threaten water- and land-based habitats
- The introduction and spread of exotic terrestrial and aquatic species that threaten native plants and animals
- Insufficient resources to implement top-priority commitments of LaMP 2000, including cleanup and restoration of all the Lake Superior AOCs

Public Comments on LaMP 2000

Although public reaction to LaMP 2000 was generally very positive, public comments contained a number of suggestions:

- The LaMP should eliminate the artificial distinctions between habitat, terrestrial wildlife communities, and aquatic communities and take a broader ecosystem approach, recognizing the interaction of land, water, and air with all living things.
- The LaMP should place greater emphasis on the sustainability of the ecosystem. Sustainability is an overarching concept that is key to successful attainment of LaMP goals; social and economic factors should not take precedence over the need for a healthy environment.
- The LaMP should place greater emphasis on public education, as it is one of the most important factors in the success or failure of the restoration of the Lake Superior ecosystem.

A summary of the comments received on LaMP 2000 and the responses to those comments will be available on the Lake Superior web site at http://www.epa.gov/glnpo/lakesuperior.

The LaMP 2002 Progress Report

Federal, state, provincial, and Tribal/First Nation governments have committed to updating the LaMP every two years in order to mark progress and to highlight achievements in restoring and protecting the Lake Superior ecosystem. This document reports on the progress made over the past two years in achieving the actions and goals outlined in LaMP 2000. It also discusses priorities and strategic directions, highlighting the principal ecosystem threats to the Lake Superior basin. In addition, the report discusses immediate next steps for action and emphasizes issues that have emerged as important themes of the LaMP, such as sustainable management of the Lake Superior basin.

The LaMP 2002 progress report is not an update of the 1,000-page technical document prepared in 2000-the various Lake Superior Workgroup committees are updating the LaMP 2000 technical document on an as-needed basis. This progress report is designed to be more reader-and user-friendly for use by local, state, provincial, Tribal/First Nations and federal decision?makers.

Contents of the Progress Report

This report is organized in six sections. Section 2 discusses the status of sustainability in the Lake Superior basin, and Section 3 reports on critical pollutants, including the progress of the ZDDP and the impact of air deposition on the lake. Section 4 describes progress made in restoring and protecting the ecosystem components of Lake Superior, including open lake and near-shore waters, wetlands, uplands, and inland lakes and tributaries. Section 5 describes integration efforts between the LaMP and other Great Lakes programs. Finally, Section 6 outlines the next steps in the LaMP implementation process. Only a continued, sustained, and dedicated effort by the residents, governments, and Tribes/First Nations of the basin will enable us to protect, restore, and maintain the Lake Superior ecosystem.

Areas of Concern

The GLWQA amendments of 1987 called for development of Remedial Action Plans (RAPs) for designated Areas of Concern (AOCs) around the Great Lakes basin. These AOCs are areas of severe environmental degradation and thus have been singled out for high-priority attention. There are eight AOCs in the Lake Superior basin: four in Canada, three in the United States, and one shared between the two countries. An update on the status of the AOCs can be found in Appendix A and on the web at *http://www.epa.gov/glnpo/aoc.*

Photograph courtesy of the Ontario Ministry of the Environment

Lake Superior Pakaskwa National Park, Ontario
Photograph by Robert F. Beltran

Lake Superior Sustainability Progress Report

Accomplishments:

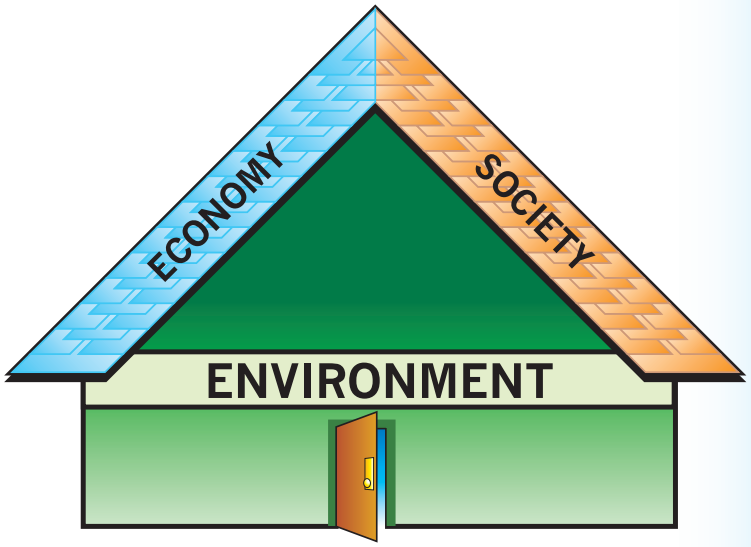
1. The Developing Sustainability Committee completed the Baseline Sustainability Indicators Project-Phase I
2. U.S. EPA/GLNPO awarded a grant for Phase II of Baseline Sustainability Indicators Project in 2001; project is underway
3. Governments are helping to facilitate mercury reduction in the U.S. portion of the Lake Superior basin, modeling efforts on the Canadian thermostat and fluorescent light recycling programs
4. The Lake Superior Binational Program hosted a workshop designed to bring together experts in the fields of ecological and social assessment in order to identify the best ways to monitor the current status of the regional ecosystem
5. The Lake Superior Forum developed a report on basin attitudes toward pollution prevention and zero discharge

Challenges/Next Steps:

1. Inadequate funding to survey the educational opportunities for, existing knowledge of, and attitudes toward sustainability practices in the Lake Superior communities
2. Need for better communication of what sustainability means in real terms to the Lake Superior basin and to the Great Lakes community at large
3. Need for Lake Superior committees to develop their own sustainability initiatives

Section 2:

Building a Sustainable Lake Superior Ecosystem



Sustainability

Environmental programs have historically been reactive in nature - that is, they have primarily been designed to clean up existing contamination problems and address environmental mismanagement. To foster a more productive future, we need to revise our approach to environmental management in order to promote sustainability. This approach involves being proactive in pursuing a balance among the environment, the economy, and social activities as a long-term goal. Lake Superior contaminants and habitat loss will still need to be addressed, but the LaMP also promotes activities to transition to a more sustainable future for the basin.

As an illustration of the necessity for sustainability, the environment, the economy, and society form a triangle whose sides are mutually supportive, as with the roof on a house. The environment's role in relation to the economy and society is similar to that of the beam holding up the roof-if the economy or society places too much of a weight burden on the environmental beam that supports them, the beam could bend, crack, or collapse altogether.

The interrelationship among our environment, economy, and society contradicts the argument that there is always a trade-off between jobs and the environment - that if jobs are created, the environment will suffer harm, or conversely, that if the environment is protected, it necessarily causes unemployment and makes job creation more difficult. Investing in the environment enhances long-term economic and social strength because it is more expensive, both economically and socially, to repair environmental damage in the future than to invest in technologies and practices that prevent such damage today.

Realizing Sustainability

The governments and residents of the Lake Superior basin have taken initial steps toward making the basin sustainable, but more needs to be done. For example, further work must be done on the sustainability indicators discussed below and their measurement so that decision-makers and the public can obtain better information when making broad policy and individual choices and when making decisions about their environment and their lives.

Although the information currently available is limited, strategies are available for pursuing sustainability. Some of these strategies include

- Developing better transportation alternatives
- Developing recycling programs and attracting industries that use recycled material
- Aggressively controlling exotic species by reducing their populations and preventing introduction of new species
- Developing alternative energy sources such as wind power, fuel cells, and other innovative technologies

- Pursuing business and economic development strategies that encourage pollution prevention
- Developing effective worker training programs for existing and new industries that develop the skills and address the technologies required for pollution prevention
- Cleaning up contaminated sites so they can be used more effectively

These are important first steps in building a society in the Lake Superior basin that can sustain itself, the economy, and the natural environment.

The Impacts of Unsustainable Activities

Areas of Concern, the most polluted sites in the Great Lakes basin, show what happens when human activities overwhelm the environment's ability to sustain those activities. Over decades, these sites, eight of which are in the Lake Superior basin, have been polluted by releases from industrial activity and contaminated runoff. They remain contaminated, threatening environmental and human health as well as limiting current and future environmental, recreational, and economic activities in these areas. It could cost tens of millions of dollars to clean up the AOCs, whereas the overall costs to the economy and society would have been much lower had the industrial pollution been prevented in the first place.

Potentially unsustainable activities are not conducted by large, industrial polluters alone. Individual land use choices can either support or undermine sustainability in a given area. For example, construction of vacation homes is significantly changing the natural landscape of the Lake Superior shoreline, which is threatened by uncoordinated and potentially unsustainable growth. Better planning could lessen these threats to the environment while allowing people to continue their enjoyment of the lake.

It should be noted that there are areas where efforts toward building sustainability are working. For example, the southern portion of the Lake Superior basin, once the site of wholesale clear-cutting of forests, now boasts tree replacement programs under which tree planting exceeds harvesting. Currently there are more challenges than success stories, but sustainability opportunities abound in the basin.

Sustainability Indicators and Trends

A major step in restoring and protecting the Lake Superior basin -- and the only way to gauge progress -- is to identify indicators against which efforts in the region can be measured. The Lake Superior Binational Program hosted a workshop designed to bring together experts in the fields of ecological and social assessment in order to identify the best ways to monitor the current status of the regional ecosystem. The workshop resulted in development of the following indicators that can be used to assess how fully the Binational Program's Vision Statement is being realized: "Reinvestment in Natural Capital," "Quality of

Source: Environment Canada

Sustainability Principles

To better manage the relationship among nature, the economy, and society in the Lake Superior basin, the LaMP process embraces five general principles to assist in achieving a sustainable Lake Superior:

1. **Adaptability.** Economic growth and social development should continually adapt to the natural cycles of the environment through decision-making based on the best scientific understanding of how technology, economics, and society affect the sustainability of the ecosystem.
2. **Equity.** No group in the basin should bear an inequitable burden in adapting to the natural cycles of the environment. Decisions based on "sound science" should also consider the social ramifications of choosing one action over another to ensure that all members of the basin community are taken into account.
3. **Knowledge.** Education, more than regulation, is a cornerstone in the process of bringing human activities and the natural cycles of the environment into balance because sustainability depends on citizens understanding that diversity of life and high-quality habitat are essential to their own quality of life.
4. **Unity.** The basin is a system of interconnected environmental, economic, and social systems. Thus, planning must be done in accordance with the cycles of the natural environment by looking at the "big picture" and how individual decisions impact other areas of the basin and its environment, economy, and society as a whole.
5. **Limits.** The environment has a finite capacity to replenish natural capital and absorb waste. Science does not yet provide the information needed to identify the exact balance among the natural environment, the economy, and society. Consequently, various ecosystem indicators, including indicators focusing on social and economic elements, are used to better estimate environmental impacts relative to this capacity.

Human Life," "Resource Consumption Patterns," "Economic Vitality," and "Awareness of Capacity for Sustainability" (see the "Lake Superior Binational Monitoring Workshop Proceedings: Directions for Measuring Progress" at http://www.epa.gov/glnpo/lakesuperior/binatmonwkshp.pdf).

To assess the ability to measure the indicators, researchers completed an initial study that relied on data generated by various agencies at sporadic intervals (see the "Baseline Sustainability Indicators" report at http://emmap.mtu.edu/gem/community/planning/lsb.html). Although it is somewhat incomplete, this "snapshot" of regional ecosystem management in the Lake Superior basin is instructive of the trends that are occurring in the basin.

Currently, the Developing Sustainability Committee of the Superior LaMP Workgroup is building on the initial study to capture a wider range of land use indicators addressing the social dimensions of sustainability, especially those associated with the State of the Lakes Ecosystem Conference (SOLEC). The second phase of work, which is supported by a grant from U.S. EPA/GLNPO, is being conducted by Michigan Technological University and focuses on the relationships among land use planning, citizen groups, and local units of government.

Use of indicators allows us to develop a "report card" for how well we are meeting our general objectives for the basin. For example, the indicators discussed below help us to assess the extent to which we are realizing the Vision Statement for Lake Superior by examining how resources are being used or valued and the physical and social patterns and stressors that affect the environment.

Reinvestment in Natural Capital

"Natural capital" refers to the value of the environment in terms of the goods and services that it provides. A primary goal in managing natural capital is ensuring that consumption of natural resources does not deplete environmental "principal," thereby saving needed resources for the future. To date, researchers have gathered data only on the status of forestry practices, exotic species control, and native fisheries as components of natural capital.

Forestry[1]

- Michigan, Minnesota, and Wisconsin have a number of programs to encourage sustainable forestry, and voluntary compliance with those programs seems to be growing. For example, the Great Lakes Forestry Alliance reported in 1995 that timber growth in Michigan, Minnesota, and Wisconsin exceeded the harvest by 90 percent and that timber volume increased from about 25 billion cubic feet in 1952 to more than 50 billion cubic feet in 1992.
- In the United States, 51.5 million acres of forested land are present in the Lake Superior basin, of which 3.2 million acres are either reserved as parks and wilderness or classified as unproductive. Of the productive land, 26 million acres are nonindustrial, private forest; 18 million acres are publicly owned; and 4 million acres are owned by forest product companies.
- In Ontario, forest sustainability is a legal requirement for Crown (public) land. Because most of the Ontario portion of the Lake Superior watershed is Crown land, a determination of forest sustainability is required in every forest management plan developed for this region. Ontario is implementing sustainable forest harvesting practices, including practices that attempt to emulate natural forest landscape disturbance patterns.

Exotic Species

- The numbers and populations of exotic species in the basin are increasing.
- Actions are being taken on the state, provincial, regional, national, and international government levels to combat these species.
- For example, the State of Michigan passed a law in 2001 that requires ocean-going and non-ocean-going ships on the Great Lakes to report their use of best management practices for control of aquatic nuisance species in ship ballast water. This law also requires the Michigan Department of Environmental Quality (MDEQ) to post lists of ships that use best management practices proposed by shipping associations and to test ballast water treatment methods.

Forest Sustainability: Criteria and Indicators

The U.S. Forest Service has chartered a project to work with individual National Forests in order to develop a forest-level (local unit criteria and indicator development or LUCID) sustainability and monitoring program that would be used to monitor and improve forest management, enhance collaboration between National Forests and other government agencies, and monitor the sustainability of national forest management. The criteria and indicators (C&I) concept provides a way to monitor and assess ecological, social, and economic sustainability.

The LUCID project has been guided by five objectives:

- Test, develop, modify, and evaluate C&I to assess the sustainability of ecological, economic, and social systems at the forest level
- Develop analysis methods that establish relationships between indicators and combine the results for the purposes of sustainability reporting
- Evaluate the relationships between national- and forest-level indicators
- Develop a research agenda to further understanding and application of forest-level C&I
- Develop a strategy to implement forest-level C&I throughout the U.S. Forest Service

Six interdisciplinary National Forest teams working on eight National Forests around the country have been active in the project, including the Ottawa National Forest in the Lake Superior basin. The teams have been working collaboratively to develop a forest-level sustainability and monitoring program that includes

- Review of a preliminary set of C&I to develop forest level-specific criteria, indicators, measures, and reference values for each forest
- Application of these C&I in field tests based on available data
- Implementation of preliminary sustainability assessments to identify areas that are contributing to the sustainability of economic, social, and ecological systems and areas that may be improved through adaptive management

The National Forest teams have completed the field portion of the project, and a national team is currently compiling and analyzing their results in a final report.

[1]Canadian data are not available because of the method of aggregation.

Planning for the Future in Marquette, Michigan

To fully implement the Vision Statement of the Binational Program, communities in the Lake Superior basin have gradually begun to develop comprehensive planning processes aimed at achieving long-term sustainability. One such proactive community is Marquette, Michigan. Since the release of LaMP 2000, various groups have further coordinated their efforts to ensure social and environmental sustainability in the greater Marquette region. A number of initiatives have been developed or strengthened, including the following:

Waste Reduction and Energy Efficiency Workshops Sponsored by MDEQ, these workshops have drawn together industry and government representatives to share information regarding innovative programs and practices. The workshops complement the ongoing mercury reduction program in Marquette coordinated by the local wastewater treatment facility, which contributes to the Binational Program's goal of zero discharge in the Lake Superior basin. For more information, contact Curt Goodman at 906-228-0485.

Regional Watershed Planning In 2001, the Central Lake Superior Watershed Partnership was recognized in Michigan as the most innovative watershed program of the year. This consortium of local government leaders, community activists, and natural resource professionals coordinates conservation programs spread across seven major watersheds in the basin. The Partnership has sponsored research on rural sprawl and sedimentation control projects and has joined forces with both Northern Michigan University and Argonne National Laboratory to monitor regional water quality. For more information, contact Carl Lindquist at 906-226-9460.

Land Protection Initiatives In an effort to protect critical habitat and private resource production lands from the unwanted side-effects of economic development activities, the Central Lake Superior Land Conservancy substantially increased its presence in Michigan's Upper Peninsula. In addition to working with landowners who want to place conservation easements on their holdings, the group has partnered with The Nature Conservancy to protect large tracts of intact forest systems, has monitored use of sustainable forestry practices on affiliated parcels, and has completed a biological community inventory for most of the Marquette County shoreline. For more information, contact Jim Cantrill at 906-249-9518.

[1]Canadian data are not available because of the method of aggregation.

Native Fisheries

- The lake trout has been restored to its historical, self-sustaining population in Lake Superior, the only Great Lake where this has occurred.
- Efforts are underway to restore the lake sturgeon, brook trout, and walleye to self-sustaining populations.

Quality of Human Life

The quality of human life category of indicators measures the incidence of crime, population density, demographics of migration, the demand for social services, transportation infrastructure status, the extent of recreational and cultural opportunities, citizen involvement in decision-making, and public access to lakeshores. These indicators assess the stressors on people's ability to live comfortably in the basin. Thus far, researchers have mostly gathered data regarding population, migration, and transportation, as summarized below.

Population and Migration[1]

- The population in the U.S. portion of the basin has declined by roughly 4 percent in the past 50 years, although 80 percent of the residents tend to remain in the same geographic area for lengthy periods of time.
- The population density remains low except in urban areas.
- Construction of vacation homes is increasing along previously undeveloped sections of the Lake Superior shoreline and throughout the basin.

Transportation

- Between 1980 and 1990, the percentage of basin workers driving alone to work rose from 58 to 73 percent while fewer workers carpooled or walked to work.
- A limited survey of traffic volumes in the Michigan part of the basin from 1987 to 1998 showed that traffic increased by an average of 34 percent. Having more cars on the road increases total car emissions, placing more stress on air quality, human health, and the ecosystem.

Resource Consumption Patterns

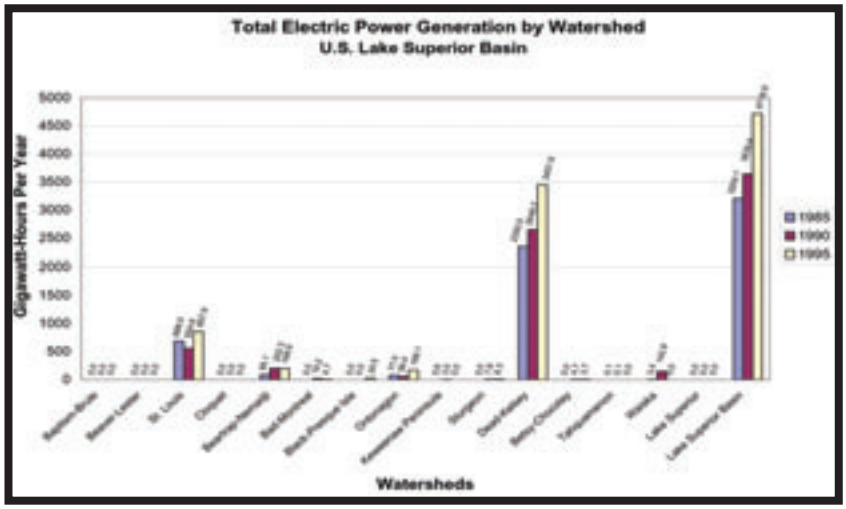
The resource consumption indicators measure the rates at which natural resources and products are consumed and recycled in the basin. This category of indicators assesses the availability of recycling programs, amounts of forest and mining resources that remain in the basin, types and quantities of electric power generation, quality and volumes of aquifers, amount of and stressors related to tourism, depletion of wildlife and fisheries, landfill capacities and incineration volumes, degree of urban sprawl, and loss of native flora. Recycling and energy production, two areas that are often viewed as leading indicators for resource consumption, are discussed below.

Recycling

- Participation in recycling programs is much higher and material recovery is much greater in Minnesota and Wisconsin, where statewide programs are well developed and certain materials are banned from landfill disposal.
- The total amount of postconsumer waste disposed of by landfilling or incineration in the U.S. portion of the basin appears to exceed 2 million cubic yards per year, straining the ability of municipalities to sustain current levels of consumption.
- Many of the larger Ontario communities have instituted municipal, industrial, or community volunteer-based recycling programs.

Energy Production[1]

- About 87 percent of the electric power generated in the basin comes from fossil fuel generators using coal, natural gas, fuel oil, or wood waste.
- The total amount of electric power generated in the U.S. portion of the basin increased 47 percent between 1985 and 1995.
- More than half of basinwide water usage supports energy production.



Economic Vitality

In the past, the Lake Superior basin's economy relied on a few large industries to support most of its residents. The economic vitality category of indicators measures the strength of the economy in the basin. Data have been collected regarding the per capita income, cost of living, extent of poverty, local employment trends, and diversity of community economies. Information related to the regional trade balance, facilitation of transitional economics, value-added industries, and regional and local tax bases has yet to be gathered. Economic diversity and, income and poverty, two areas that have received much attention in the basin during the last few years, are discussed below.

Economic Diversity

- Economic diversity is increasing in the U.S. portion of the basin. There is less reliance on large industries such as mining, which has been downsizing because of shifts in economic demand.
- The Ontario portion of the basin remains very dependent on large, individual industries and continues to support single-industry communities. It is also suffering the consequences of industrial downsizing and, mine and plant closures. The mining, ore processing and milling, sawmills, pulp mill, and tourism industries are major employers in the Ontario basin.

[1]Canadian data are not available because of the method of aggregation.

Income and Poverty[1]

- Although economic diversity is increasing, median family and household incomes within the U.S. portion of the basin are below the national averages.
- Between 1979 and 1989, the extent of poverty among all persons, families, and children increased at a greater rate in the U.S. portion of the basin than in the United States as a whole during that period.
- The decline of the mining industry had a significant impact on the basin's economy, as wages fell and joblessness grew. The basin economic sectors that have grown tend to pay lower wages than did the older industries that operated in the area in the past.

Awareness of Capacity for Sustainability

Any drive toward sustainability must be grounded in the actions of local communities; long-term progress in the Lake Superior basin will require that its citizens be educated in sustainability concepts. Knowledge of and attitudes toward sustainability vary from community to community in the basin. Some residents would embrace sustainable lifestyles if they had more information on sustainable practices.

The Lake Superior Binational Forum has successfully developed a number of initiatives to enhance awareness among basin citizens of the importance of the Binational Program; regional consumption habits; the import, export, and life-cycle of commodities; and local industries' innovative practices. Other educational initiatives aim to enhance awareness of the connection between consumption and exploitation of resources and humans in other parts of the world in order to satisfy local needs.

In addition, the Binational Forum held a workshop that examined the issue of electric power generation in terms of meeting the goal of zero discharge through mercury control technology, alternative sources of electricity, and energy conservation.

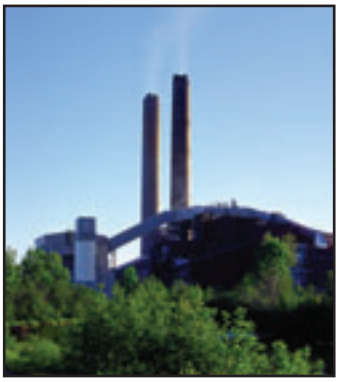
[1]Canadian data are not available because of the method of aggregation.

Next Steps

The Developing Sustainability Committee plans to build on the efforts of the Binational Forum through creation of a Community Awareness Review and Development (CARD) project. As part of this project, basin residents would be surveyed and would participate in discussions led by community-based facilitators in 13 basin communities. The facilitators would determine what people know and feel about sustainability by working with civic organizations, chambers of commerce, school districts, and local government. After assessing this information, CARD researchers would return to the communities in order to help residents build sustainability by viewing their communities as systems dependent on various economic, social, and physical resources. The CARD project would provide education and technical assistance to help the communities take more concrete steps toward sustainability.

Moving Toward Sustainability

The activities and indicators described above constitute the start of a movement toward a more sustainable Lake Superior basin. As important as the concept of sustainability is to the Lake Superior Binational Program, most activities sponsored by the program have thus far focused on addressing problems associated with critical pollutants or species and habitat in the basin ecosystem. The following two sections focus on these issues precisely because they are important to sustaining Lake Superior basin communities well into the future. However, additional work will be needed to ensure that the basin's environment, economy, and society remain mutually supportive.



Marquette Power Plant
Photograph by Patrick T. Collins,
Minnesota Department of Natural Resources

Critical Pollutants Progress Report

Accomplishments:

1. Initiated community-based pollution prevention projects focusing on mercury awareness and product recycling; examples include projects in Duluth, Silver Bay, and Minnesota's north shore communities; the EcoSuperior projects in Thunder Bay and north shore communities; and the community projects in Superior and Ashland, Wisconsin, and Marquette, Michigan. The city of Duluth, Minnesota, was the first local government in the U.S. to ban mercury thermometers
2. Developed voluntary agreements to reduce mercury at eight facilities in the Minnesota portion of the basin.
3. Implementing mercury-free schools program in the U.S. (mercury-free schools in Michigan, Northwest Wisconsin Mercury Shakedown, and Mercury Free Zone in Minnesota)
4. Conducting education and outreach to reduce backyard trash burning that produces dioxin and mercury emissions in Michigan, northeastern Minnesota, northwestern Wisconsin, and Ontario
5. Phasing out the use of PCBs in Canadian pulp and paper mills and the electric power generation sector
6. Introduced Ontario air emissions monitoring and reporting regulation to track 358 pollutants from many sources

Challenges:

1. Achieve 80 percent mercury reduction by 2010 by reducing mercury emissions from coal-burning utility and U.S. mining sectors and reducing individual use of mercury-containing products
2. Remediate AOCs by identifying adequate funding sources and coordinating zero discharge goals and the cleanup end points set by programs such as Superfund
3. Reduce backyard trash burning which releases chemicals known as dioxins by changing individual behavior via education regarding the human and environmental health risks associated with backyard burning
4. Conduct comprehensive U.S. chemical contaminant monitoring of fish for human and environmental purposes by identifying long-term funding sources to conduct trend analyses and coordinating among regional agencies to maximize benefits
5. Coordinate with other national and international efforts such as the Binational Toxics Strategy, the North American Agreement on Environmental Cooperation, and the Global Treaty on Persistent Organic Pollutants (POPs)
6. Track dioxin sources by improving compliance in the United States

Next Steps:

1. Track in-use and in-storage PCBs in the basin more closely
2. Expand outreach efforts to encourage PCB disposal on the Canadian side
3. Complete pilot study on disposal of PCBs from small facilities in Minnesota
4. Develop a mercury retirement strategy
5. Identify out-of-basin sources of LaMP critical pollutants in coordination with Great Lakes Binational Toxics Strategy